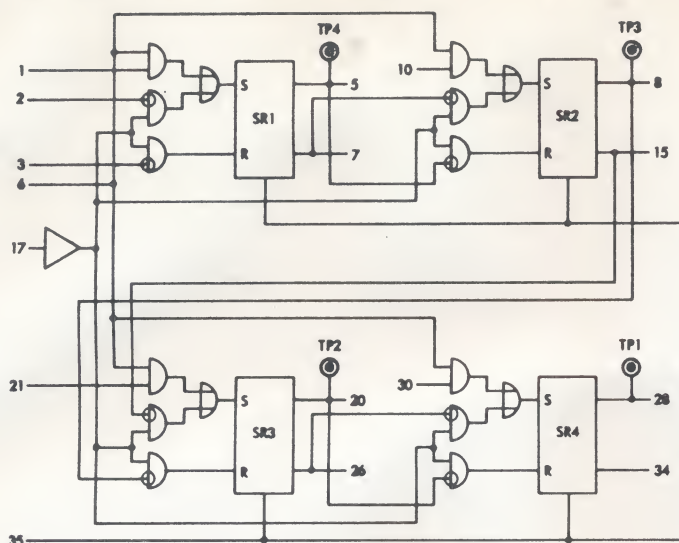


RAYTHEON COMPUTER

GERMANIUM
GSR4
 SHIFT
 REGISTER

KEY SLOTS 23, 33



The GSR4 is a four-stage shift register designed to operate in serial-parallel, parallel-serial, or serial-serial modes.

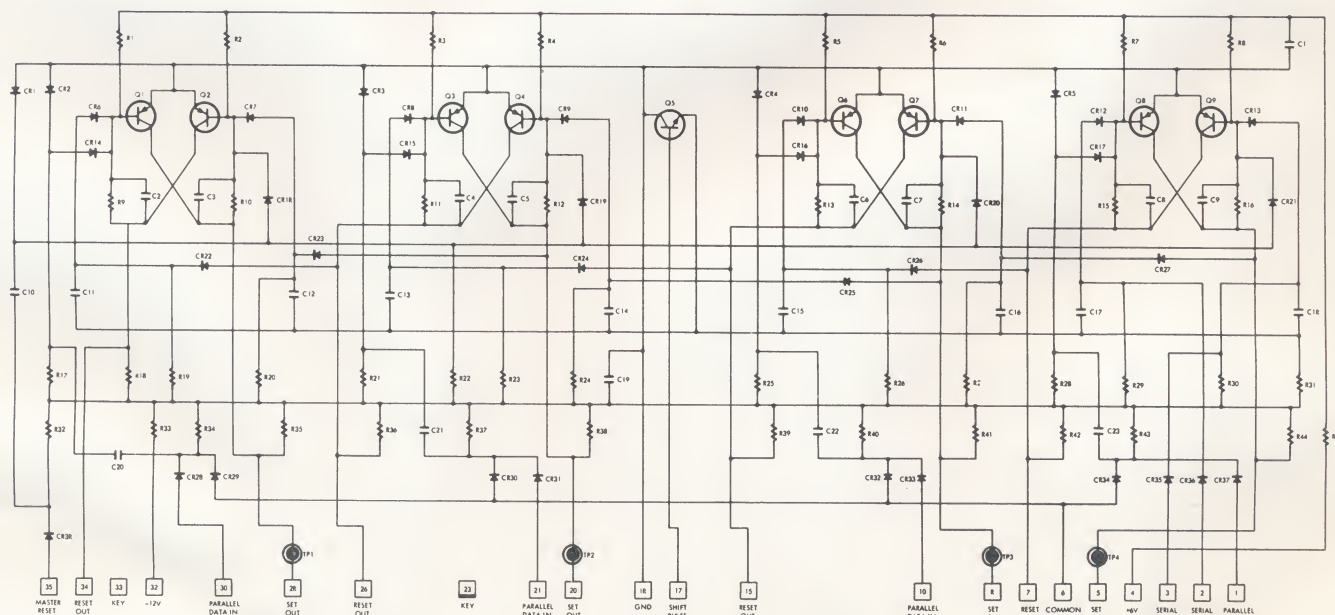
The set side of each flip-flop provides parallel data entry through a two input AND gate. The other inputs to each AND gate are connected together for a common transfer input. A ONE is entered into the flip-flop when the parallel data input is at binary ONE and the common transfer input goes from binary ONE to binary ZERO. The register should be in the reset state before parallel data is entered. A master reset input is provided to reset all four stages simultaneously.

Serial entry is provided by means of two two-input set and reset AND gates connected to the first flip-flop of the register. One input of each gate is connected together for the shift pulse input. The serial Set and serial Reset data inputs should always be complements of each other. A ONE is entered into the first stage when the set input is at binary ZERO and the shift pulse input goes from binary ONE to binary ZERO.

The outputs may be taken serially from a given flip-flop, in parallel from all flip-flops at once, or in some serial-parallel combination. Additional shift registers may be cascaded to form a register of any length.

SPECIFICATIONS

MODULE	GSR4-2	GSR4-1	GSR4-5
INPUT			
Frequency	0 to 200 kc	0 to 1 Mc	0 to 5 Mc
Voltage Levels			
One (-10V nominal)	-9 to -12V	-8 to -12V	-7 to -12V
Zero (0 V nominal)	0 to -1V	0 to -1V	0 to -1V
Shift, Set, Reset & Parallel			
Minimum Amplitude	8V	8V	7V
Maximum Rise Time	1μsec	0.25μsec	60 nsec
Minimum Dwell (at binary one level)	2μsec	0.4μsec	80 nsec
Input Load			
Common Transfer	4 N loads	4 N loads	8 N loads
Parallel, Serial, Shift	1 N load	1 N load	2 N loads
Noise Rejection	2V	2V	1.5V
Master Reset			
Minimum Amplitude	8V	8V	7V
Maximum Rise Time	1μsec	0.25μsec	60 nsec
Minimum Dwell (at binary one level)	10μsec	2μsec	0.5μsec
Input Load	1 N load	1 N load	2 N loads
	1/2 C2 load	1/2 C1 load	1/2 C5 load
OUTPUT			
Voltage Levels (full load)			
One (-10V nominal)	-9 to -12V	-8 to -12V	-7 to -12V
Zero (0 V nominal)	0 to -0.25V	0 to -0.3V	0 to -0.3V
Maximum Rise Time (no load)	0.25μsec	0.1μsec	30 nsec
Maximum Fall Time (no load)	0.5μsec	0.2μsec	50 nsec
Maximum Rise Time (full load)	1μsec	0.25μsec	50 nsec
Drive Capability	7 N loads	7 N loads	12 N loads
	5 P loads	10 P loads	18 P loads
	2 C2 loads	2 C1 loads	1 C5 loads
	1000 pf	300 pf	50 pf
Maximum Wiring Capacitance (per output)			
PROPAGATION DELAY	0.2μsec	0.1μsec	60 nsec
POWER REQUIREMENTS (per card)			
-12V	107 ma	110 ma	130 ma
+6V	1.8 ma	1.7 ma	2.3 ma



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